PowerCage™ MTP 15HD RSA Series

MTP Twisted Pair Transmitter and Receiver Modular Boards

Extron® Electronics
INTERFACING, SWITCHING AND CONTROL

Safety Instructions • English

⚠ **This symbol is intended to alert the user of important operating and mainte-nance (servicing) instructions in the literature provided with the equipment.**

⚡ **This symbol is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.**

Caution
Read Instructions • Read and understand all safety and operating instructions before using the equipment.
Retain Instructions • The safety instructions should be kept for future reference.
Follow Warnings • Follow all warnings and instructions marked on the equipment or in the user information.
Avoid Attachments • Do not use tools or attachments that are not recommended by the equipment manufacturer because they may be hazardous.

Consignes de Sécurité • Français

⚠ **Ce symbole sert à avertir l'utilisateur que la documentation fournie avec le matériel contient des instructions importantes concernant l'exploitation et la maintenance (réparation).**

⚡ **Ce symbole sert à avertir l'utilisateur de la présence dans le boîtier de l'appareil de tensions dangereuses non isolées posant des risques d'électrocution.**

Attention
Lire les instructions• Prendre connaissance de toutes les consignes de sécurité et d'exploitation avant d'utiliser le matériel.
Conserver les instructions• Ranger les consignes de sécurité afin de pouvoir les consulter à l'avenir.
Respecter les avertissements • Observer tous les avertissements et consignes marqués sur le matériel ou présentés dans la documentation utilisateur.
Eviter les pièces de fixation • Ne pas utiliser de pièces de fixation ni d'outils non recommandés par le fabricant du matériel car cela risquerait de poser certains dangers.

Sicherheitsanleitungen • Deutsch

⚠ **Dieses Symbol soll dem Benutzer in der im Lieferumfang enthaltenen Dokumentation besonders wichtige Hinweise zur Bedienung und Wartung (Instandhaltung) geben.**

⚡ **Dieses Symbol soll den Benutzer darauf aufmerksam machen, daß im Inneren des Gehäuses dieses Produktes gefährliche Spannungen, die nicht isoliert sind und die einen elektrischen Schock verursachen können, herrschen.**

Achtung
Lesen der Anleitungen • Bevor Sie das Gerät zum ersten Mal verwenden, sollten Sie alle Sicherheits-und Bedienungsanleitungen genau durchlesen und verstehen.
Aufbewahren der Anleitungen • Die Hinweise zur elektrischen Sicherheit des Produktes sollten Sie aufbewahren, damit Sie im Bedarfsfall darauf zurückgreifen können.
Befolgen der Warnhinweise • Befolgen Sie alle Warnhinweise und Anleitungen auf dem Gerät oder in der Benutzerdokumentation.
Keine Zusatzgeräte • Verwenden Sie keine Werkzeuge oder Zusatzgeräte, die nicht ausdrücklich vom Hersteller empfohlen wurden, da diese eine Gefahrenquelle darstellen können.

Instrucciones de seguridad • Español

⚠ **Este símbolo se utiliza para advertir al usuario sobre instrucciones impor-tantes de operación y mantenimiento (o cambio de partes) que se desean destacar en el contenido de la documentación suministrada con los equipos.**

⚡ **Este símbolo se utiliza para advertir al usuario sobre la presencia de elemen-tos con voltaje peligroso sin protección aislante, que puedan encontrarse dentro de la caja o alojamiento del producto, y que puedan representar riesgo de electrocución.**

Precaucion
Leer las instrucciones • Leer y analizar todas las instrucciones de operación y seguridad, antes de usar el equipo.
Conservar las instrucciones • Conservar las instrucciones de seguridad para futura consulta.
Obedecer las advertencias • Todas las advertencias e instrucciones marcadas en el equipo o en la documentación del usuario, deben ser obedecidas.

安全须知 • 中文

⚠ 这个符号提示用户该设备用户手册中有重要的操作和维护说明。

⚡ 这个符号警告用户该设备机壳内有暴露的危险电压，有触电危险。

注意
阅读说明书 • 用户使用该设备前必须阅读并理解所有安全和使用说明。
保存说明书 • 用户应保存安全说明书以备将来使用。
遵守警告 • 用户应遵守产品和用户指南上的所有安全和操作说明。
避免追加 • 不要使用该产品厂商没有推荐的工具或追加设备，以避免危险。

Warning
Power sources • This equipment should be operated only from the power source indicated on the product. This equipment is intended to be used with a main power system with a grounded (neutral) conductor. The third (grounding) pin is a safety feature, do not attempt to bypass or disable it.
Power disconnection • To remove power from the equipment safely, remove all power cords from the rear of the equipment, or the desktop power module (if detachable), or from the power source receptacle (wall plug).
Power cord protection • Power cords should be routed so that they are not likely to be stepped on or pinched by items placed upon or against them.
Servicing • Refer all servicing to qualified service personnel. There are no user-serviceable parts inside. To prevent the risk of shock, do not attempt to service this equipment yourself because opening or removing covers may expose you to dangerous voltage or other hazards.
Slots and openings • If the equipment has slots or holes in the enclosure, these are provided to prevent overheating of sensitive components inside. These openings must never be blocked by other objects.
Lithium battery • There is a danger of explosion if battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Avertissement
Alimentations • Ne faire fonctionner ce matériel qu'avec la source d'alimentation indiquée sur l'appareil. Ce matériel doit être utilisé avec une alimentation principale comportant un fil de terre (neutre). Le troisième contact (de mise à la terre) constitue un dispositif de sécurité : n'essayez pas de la contourner ni de la désactiver.
Déconnexion de l'alimentation• Pour mettre le matériel hors tension sans danger, déconnectez tous les cordons d'alimentation de l'arrière de l'appareil ou du module d'alimentation de bureau (s'il est amovible) ou encore de la prise secteur.
Protection du cordon d'alimentation • Acheminer les cordons d'alimentation de manière à ce que personne ne risque de marcher dessus et à ce qu'ils ne soient pas écrasés ou pincés par des objets.
Réparation-maintenance • Faire exécuter toutes les interventions de réparation-maintenance par un technicien qualifié. Aucun des éléments internes ne peut être réparé par l'utilisateur. Afin d'éviter tout danger d'électrocution, l'utilisateur ne doit pas essayer de procéder lui-même à ces opérations car l'ouverture ou le retrait des couvercles risquent de l'exposer à de hautes tensions et autres dangers.
Fentes et orifices • Si le boîtier de l'appareil comporte des fentes ou des orifices, ceux-ci servent à empêcher les composants internes sensibles de surchauffer. Ces ouvertures ne doivent jamais être bloquées par des objets.
Lithium Batterie • Il a danger d'explosion s'Il y a remplacment incorrect de la batterie. Remplacer uniquement avec une batterie du meme type ou d'un ype equivalent recommande par le constructeur. Mettre au reut les batteries usagees conformement aux instructions du fabricant.

Vorsicht
Stromquellen • Dieses Gerät sollte nur über die auf dem Produkt angegebene Stromquelle betrieben werden. Dieses Gerät wurde für eine Verwendung mit einer Hauptstromleitung mit einem geerdeten (neutralen) Leiter konzipiert. Der dritte Kontakt ist für einen Erdanschluß, und stellt eine Sicherheitsfunktion dar. Diese sollte nicht umgangen oder außer Betrieb gesetzt werden.
Stromunterbrechung • Um das Gerät auf sichere Weise vom Netz zu trennen, sollten Sie alle Netzkabel aus der Rückseite des Gerätes, aus der externen Stomversorgung (falls dies möglich ist) oder aus der Wandsteckdose ziehen.
Schutz des Netzkabels • Netzkabel sollten stets so verlegt werden, daß sie nicht im Weg liegen und niemand darauf treten kann oder Objekte darauf- oder unmittelbar dagegengestellt werden können.
Wartung • Alle Wartungsmaßnahmen sollten nur von qualifiziertem Servicepersonal durchgeführt werden. Die internen Komponenten des Gerätes sind wartungsfrei. Zur Vermeidung eines elektrischen Schocks versuchen Sie in keinem Fall, dieses Gerät selbst öffnen, da beim Entfernen der Abdeckungen die Gefahr eines elektrischen Schlags und/oder andere Gefahren bestehen.
Schlitze und Öffnungen • Wenn das Gerät Schlitze oder Löcher im Gehäuse aufweist, dienen diese zur Vermeidung einer Überhitzung der empfindlichen Teile im Inneren. Diese Öffnungen dürfen niemals von anderen Objekten blockiert werden.
Litium-Batterie • Explosionsgefahr, falls die Batterie nicht richtig ersetzt wird. Ersetzen Sie verbrauchte Batterien nur durch den gleichen oder einen vergleichbaren Batterietyp, der auch vom Hersteller empfohlen wird. Entsorgen Sie verbrauchte Batterien bitte gemäß den Herstelleranweisungen.

Evitar el uso de accesorios • No usar herramientas o accesorios que no sean especificamente recomendados por el fabricante, ya que podrian implicar riesgos.

Advertencia
Alimentación eléctrica • Este equipo debe conectarse únicamente a la fuente/tipo de alimentación eléctrica indicada en el mismo. La alimentación eléctrica de este equipo debe provenir de un sistema de distribución general con conductor neutro a tierra. La tercera pata (puesta a tierra) es una medida de seguridad, no puentearia ni eliminaria.
Desconexión de alimentación eléctrica • Para desconectar con seguridad la acometida de alimentación eléctrica al equipo, desenchufar todos los cables de alimentación en el panel trasero del equipo, o desenchufar el módulo de alimentación (si fuera independiente), o desenchufar el cable del receptáculo de la pared.
Protección del cables de alimentación • Los cables de alimentación eléctrica se deben instalar en lugares donde no sean pisados ni apretados por objetos que se puedan apoyar sobre ellos.
Reparaciones/mantenimiento • Solicitar siempre los servicios técnicos de personal calificado. En el interior no hay partes a las que el usuario deba acceder. Para evitar riesgo de electrocución, no intentar personalmente la reparación/mantenimiento de este equipo, ya que al abrir o extraer las tapas puede quedar expuesto a voltajes peligrosos u otros riesgos.
Ranuras y aberturas • Si el equipo posee ranuras o orificios en su caja/alojamiento, es para evitar el sobrecalentamiento de componentes internos sensibles. Estas aberturas nunca se deben obstruir con otros objetos.
Batería de litio • Existe riesgo de explosión si esta batería se coloca en la posición incorrecta. Cambiar esta batería únicamente con el mismo tipo (o su equivalente) recomendado por el fabricante. Desachar las baterías usadas siguiendo las instrucciones del fabricante.

警告
电源 • 该设备只能使用产品上标明的电源。 设备必须使用有地线的供电系统供电。 第三条线（地线）是安全设施，不能不用或跳过。
拔掉电源 • 为安全地从设备拔掉电源，请拔掉所有设备后或桌面电源的电源线，或任何接到市电系统的电源线。
电源线保护 • 妥善布线，避免被踩踏，或重物挤压。
维护 • 所有维修必须由认证的维修人员进行。 设备内部没有用户可以更换的零件。为避免出现触电危险不要自己试图打开设备盖子维修该设备。
通风孔 • 有些设备机壳上有通风槽或孔，它们是用来防止机内敏感元件过热。 不要用任何东西挡住通风孔。
锂电池 • 不正确的更换电池会有爆炸的危险。必须使用与厂家推荐的相同或相近型号的电池。按照生产厂的建议处理废弃电池。

FCC Class A Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

The Class A limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Symbol Convention

The following symbols are used throughout the guide and carry the following meanings:

TIP: A Tip provides a suggestion to make setting up or working with the device easier.

NOTE: A Note draws attention to important information.

CAUTION: A Caution warns of things or actions that might damage the equipment.

WARNING: A Warning warns of things or actions that might cause injury, death, or other severe consequences.

Contents

Introduction

- **About this Guide**
- **About the PowerCage™ MTP 15HD RSA Transmitters and Receivers**
- **Features**

About this Guide

This guide contains information about the following Extron®
PowerCageMTP 15HD RSA modular board-designed twisted pair transmitters and receivers for the PowerCage Modular Power Enclosures:

- **PowerCage MTP T 15HD RSA transmitter**
- **PowerCage MTP R 15HD RSA SEQ receiver**

This guide includes instructions for an experienced installer to install, configure, and operate the equipment.

> **NOTE:**   In this guide, the term "PowerCage MTP 15HD RSA" refers to both MTP T 15HD RSA transmitter and MTP R 15HD RSA SEQ receiver boards. Where differences exist between the two boards, the full name of the board is used in the description.

About the PowerCage MTP 15HD RSA Transmitters and Receivers

The Extron PowerCage MTP 15HD RSA transmitters and receivers are modular board-designed MTP Twisted Pair boards that are exclusively for use in Extron PowerCage 1600 enclosure. They can be used with any CAT 5, 5e, or 6, or with Extron Enhanced Skew-Free™ A/V UTP cable, and are compatible with all MTP products.

The PowerCage MTP 15HD RSA transmitters and receivers must be installed in an Extron PowerCage enclosure.

> **NOTE:**   To mount and install the Extron PowerCage, refer to the guide supplied with the unit, or the *PowerCage 1600 Enclosure User Guide*, at www.extron.com.

The PowerCage MTP 15HD RSA transmitters and receivers boards are as follows:

- **PowerCage MTP T 15HD RSA transmitter —** This board supports RGB, HD-YUV, YUV, S-video and composite video on a 15-pin HD VGA connector, and audio on a 5-pole captive screw connector. The output to a compatible MTP receiver is made over twisted pair cabling (CAT 5, 5e, 6, or Enhanced Skew-Free UTP cable) via the RJ-45 connector.

    There is a 3-pole, captive screw connector for RS-232 communication.

    A 2-pole DIP switch on the board allows the user (using switch #2) to select between RS-232 and audio transmission (default setting is audio).

    > **NOTE:**   See the "Board Setup and Operation" section, for details of how to access and set the DIP switches.

The transmitter board also features EDID emulation, whereby the correct refresh rate and resolution is applied to the incoming computer signal, ensuring a proper image output display.

Two DIP switches on the board allows the user to set the refresh rate to 50 or 60 Hz (default is 60 Hz) using switch #1. The second switch controls the RS-232/audio setting.

The resolution is selected by turning the 16-position rotary encoder to the desired setting. The default setting is 1024x768.

> **NOTE:** The EDID encoder and DIP switch combination point to pre-stored EDID information block to send to the RGB input. See the "Board Setup and Operation" section for a table of settings, and details of how to access set the switches and encoder.

In addition, a toggle switch on the rear panel is available to turn the pre-peaking on or off. When turned on, pre-peaking boosts signal transmission distance.

The rear panel has an LED that lights green when power is applied to the board.

- **PowerCage MTP R 15HD RSA SEQ receiver —** This board supports RGB, HD-YUV, YUV, S-video and composite video outputs on a 15-pin HD VGA connector, and audio or RS-232 on a 5-pole captive screw connector.

  The input from a compatible MTP transmitter is made over twisted pair cabling via the RJ-45 connector.

  This board has a level, peaking, and skew adjustment feature. When adjustment is necessary, the selection between skew, level, and peaking is made via a recessed button.

  The single digital encoder is used to adjust each individual setting (red skew, green skew, blue skew, level and peaking) as needed.

  Four DIP switches on the board allow the user to set the horizontal sync (switch #1), vertical sync (switch #2), bi- or unidirectional RS-232 communication (switch #3), and routing S-video (switch #4). Switches 5 and 6 are not used.

  The rear panel also has an LED that lights green when power is applied to the board.

> **NOTE:** For full operating details, see the "Installation and Operation" section, in this guide.

Features

- Modular, field-upgradeable, and hot-swappable boards designed for the PowerCage 1600 enclosure — Additional transmitter and receiver boards may be added at any time for quick and easy upgradeability or expansion. Hot-swappable components allow the user to replace boards at any time with no need to power down the system. This is useful for mission-critical applications that require continuous system operation.

- Space-saving design in a compact 3U, rack-mountable enclosure — The compact design of the PowerCage 1600 enclosure accommodates up to 16 single-slot or 8 double-slot boards. The PowerCage 1600 eliminates individual power supplies for each transmitter and receiver, and provides forced-air cooling for each module.

- Supports RGBHV, RGBS, RGsB, RsGsBs, component video, composite video, and S-video

- Compatible with HDTV component video, bi-level or tri-level sync

- LED power indicator

- Compatible with all MTP products

- **PowerCage MTP T 15HD RSA** transmits high resolution video and mono audio or RS-232 signals 600 feet (185 meters) or more over a single twisted pair cable.

  o Inputs: Female 15-pin HD connector for video, 5-pole captive screw connector for audio input, 3-pole captive screw connector for RS-232 communication.

  o Output: Female RJ-45 connector

  o EDID emulation — A selectable feature for specifying the rate of the incoming VGA signal, EDID emulation allows proper communication with the video source.

  o Switchable video output pre-peaking — Provides additional compensation for optimal performance on the longest cable runs, ensuring the highest quality signal at the display.

PowerCage MTP R 15HD RSA SEQ receives high resolution video and mono audio or RS-232 signals 600 feet (185 meters) or more over a single twisted pair cable

  o Input: Female RJ-45 connector

  o Outputs: Female 15-pin HD connector for video, 5-pole captive screw connector for audio or RS-232 communication.

  o Compatible with HDTV component video, bi-level or tri-level sync

  o Separate variable level and peaking controls

  o Independent skew compensation adjustments for each color

Installation and Operation

This section describes the installation and operation of the PowerCage MTP T 15HD RSA and MTP R 15HD RSA SEQ, including:

• **Installing the Boards into the PowerCage Enclosure**

• **Board Connections, LEDs, and Rear Panel Features**

• **PowerCage Front Panel Port, Control, and Indicators**

• **Board Setup and Operation**
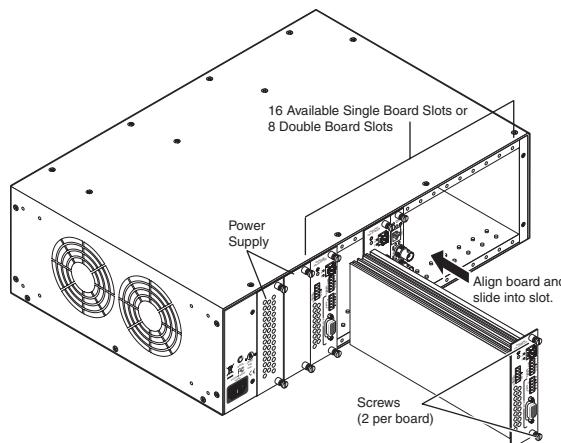
Installing the Boards into the PowerCage Enclosure

Up to 16 single slot or 8 dual slot input/output boards can be inserted into the PowerCage enclosure. The PowerCage MTP T 15HD RSA transmitters are single slot boards, and PowerCage MTP R 15HD RSA SEQ receivers are **dual slot** boards.

> **NOTES:** The boards are hot-swappable; they can be installed or removed without turning off or disconnecting the power to the PowerCage enclosure.

> **CAUTION:** Use ESD precautions when installing a board to avoid damaging the board. Keep the board in the anti-static bag until needed. Use proper grounding techniques during installation..

1. Where applicable, remove as many blank plates or previously installed boards from the rear of the PowerCage as necessary for the number of new boards to be installed.

2. Hold the board with the signal connectors towards you and the LED at the top, and align the top and bottom grooves of the board with the slide posts in the selected enclosure slot. See the example in figure 1.

16 Available Single Board Slots or
8 Double Board Slots

Power
Supply

Align board and
slide into slot.

Screws
(2 per board)
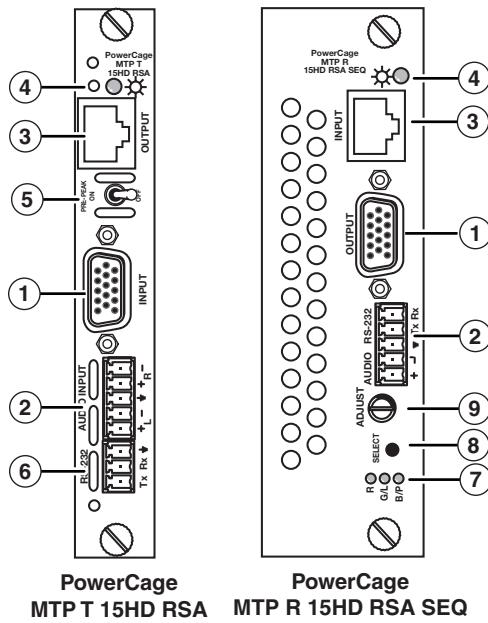
**Figure 1.** Inserting Boards into the PowerCage Enclosure

3. Carefully slide the board into the slot, aligning the two tabs on the lower front end of the board with the matching ports in the enclosure. Push the board firmly into place. Tighten the screws to secure the board in place.

> **NOTE:** Use a tool to fully tighten the screws after initial installation and subsequent removal and replacement of the boards..

4. Repeat steps **2** and **3** for all boards needing installation.

Board Connections, LEDs, and Rear Panel Features

PowerCage
MTP T 15HD RSA

PowerCage
MTP R 15HD RSA SEQ

Figure 2. PowerCage MTP 15HD RSA Board Connectors

① **15-pin HD VGA connectors —**
MTP T 15HD RSA board — Connect RGB, HD-YUV, YUV, S-video, or composite inputs to this connector.
MTP R 15HD RSA SEQ board — Connect suitable display devices to this connector for RGBHV, RGBS, RGsB, RsGsBs, HD-YUV, YUV, S-video, or composite output.
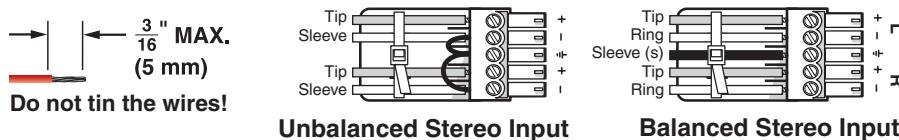
> **NOTE:** DIP switch settings on the receiver allows the user to switch chroma from the red channel to the blue channel.

② **Audio connector (5-pole captive screw) —**
MTP T 15HD RSA board — Connect an audio input source to the 5-pole captive screw connector. Wire the captive screw connector as shown below. Use the supplied tie-wrap to secure the audio cable to the connector.
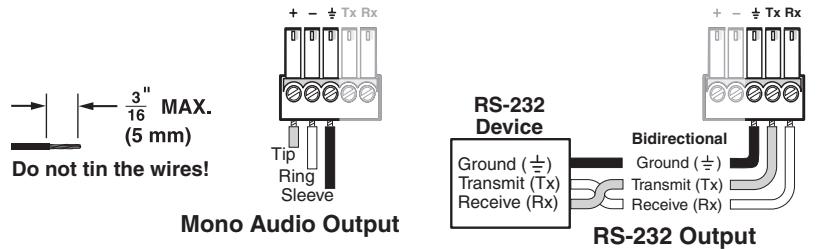
$\frac{3}{16}$ " MAX.
(5 mm)
Do not tin the wires!

Unbalanced Stereo Input

Balanced Stereo Input

Figure 3. Captive Screw Connector Wiring for Stereo Audio Input

MTP R 15HD RSA SEQ board — On this board, this is an audio and RS-232 output connector. Wire and insert a 5-pole captive screw connector for mono audio and/or RS-232 serial output. Wire the connector as shown in figure 4.
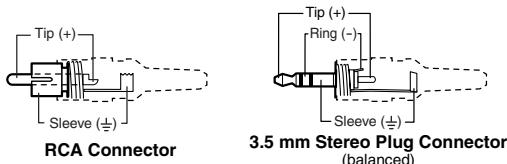
> **NOTE:** The receiver auto-detects whether the signal on the audio/RS-232 pair of the TP input is audio or RS-232. It then converts the signal content accordingly, and outputs the signals on the appropriate pins of this connector.

Figure 4. Captive Screw Connector Wiring for Audio and/or RS-232 Output

> **NOTE:** The length of exposed wires is critical. The ideal length is 3/16 inch (5 mm). If the stripped section of wire is longer than 3/16 inch, the exposed wires may touch, causing a short circuit. If it is shorter than 3/16 inch, wires can be easily pulled out of the captive screw connectors.

Figure 5 identifies the tip, ring, and sleeve parts of standard audio connectors. A mono (RCA) audio connector consists of the tip and sleeve. A stereo audio connector consists of the tip, ring and sleeve. The tip, ring, and sleeve wires are also shown on the captive screw audio connector diagrams.
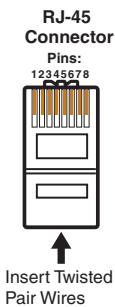
Figure 5. Typical Audio Connectors

③ **RJ-45 connector —**
MTP T 15HD RSA board — Connect the transmitter to a suitable MTP receiver via this connector. Terminate the cable as shown at right, using the same standard (A or B) at both ends
MTP R 15HD RSA SEQ board — Connect the twisted pair cable from the transmitter to this input connector. Terminate the cable using the same standard (A or B) at both ends.

Pin	T568A Wire color	T568B Wire color
1	White-green	White-orange
2	Green	Orange
3	White-orange	White-green
4	Blue	Blue
5	White-blue	White-blue
6	Orange	Green
7	White-brown	White-brown
8	Brown	Brown

> **NOTE:** If using Enhanced Skew-Free A/V cable, use the TIA T568A standard only.

> **CAUTION:** Do not connect the twisted pair input cables to any devices LAN port, or connect a LAN cable to the MTP ports.

④ **Power LED —** This LED lights green to indicate that power is applied to the board.

⑤ **Pre-peaking toggle switch (MTP T 15HD RSA only) —** This switch toggles pre-peaking on or off. Pre-peaking boosts the transmission distance for long cable runs.

> **NOTE:** The transmission distance varies greatly depending on the signal resolution and on the type of cable, graphic card, and display used in the system.
> **See distance table on page 7**

Maximum Transmitter to Receiver Distance — Analog Signals at 60 Hz				
Video Format	With Pre-Peak Off. Feet (Meters)	With Pre-Peak On. Feet (Meters)	Max. Distance (High Quality). Feet (Meters)	Max. Distance (Variable Quality). Feet (Meters)
Composite, S-video, Component Video			800 (245)	1000 (300)
640 x 480	<300 (90)	>350 (105)	700 (215)	750 (230)
800 x 600	<300 (90)	>350 (105)	550 (170)	650 (200)
1024 x 768*	<300 (90)	>350 (105)	500 (150)	600 (185)
1280 x 960	<300 (90)	>350 (105)	400 (120)	500 (150)
1280 x 1024*	<250 (75)	>300 (90)	350 (105)	450 (135)
1360 x 765	<250 (75)	>300 (90)	400 (120)	500 (150)
1365 x 768	<250 (75)	>300 (90)	400 (120)	450 (135)
1366 x 768	<250 (75)	>300 (90)	400 (120)	450 (135)
1400 x 1050	<250 (75)	>300 (90)	350 (105)	400 (120)
1440 x 900	<250 (75)	>300 (90)	350 (105)	400 (120)
1600 x 1200*	<250 (75)	>300 (90)	300 (90)	450 (135)
1920 x 1200	<250 (75)	>300 (90)	300 (90)	400 (120)
2048 x 1080	<250 (75)	>300 (90)	300 (90)	400 (120)
HDTV 720p	<250 (75)	>300 (90)	400 (120)	500 (150)
HDTV 1080i	<250 (75)	>300 (90)	300 (90)	400 (120)
HDTV 1080p	<250 (75)	>300 (90)	300 (90)	400 (120)

* same spec at 75 Hz

Figure 6. **Maximum Transmission Distances for Analog Signals at 60 Hz**

⑥ **RS-232 connector (3-pole captive screw - MTP T 15HD RSA only) —** Connect to this for bi- or unidirectional RS-232 communication. The RS-232 function is only available by setting the on-the-board DIP switch from audio to RS-232 communication. The default is audio. See page 8 for setting the DIP switch.
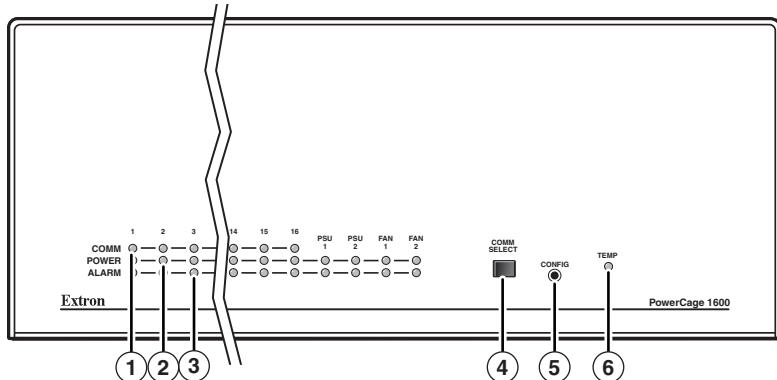
⑦ **Skew, Peaking and Level LEDs (MTP R 15HD RSA SEQ only) —** These three LEDs (red, green, and blue) are used to indicate the misaligned colors when adjusting the Skew Equalization settings. They are also used for identifying Peaking and Level modes when adjusting for signal loss or optimizing the image for various cable lengths. The LEDs are labelled: R =Red, G/L = Green/Level, B/P = Blue/Peaking

> **NOTES:** **Skew** is the color misalignment present in twisted pair A/V systems using Category 5, 5e, or 6 cable in which the red, green, and blue video signals arrive at the display at different times.
> **Level** alters the video output voltage to affect the brightness of the displayed image.
> **Peaking** affects the sharpness of a picture.

⑧ **Select Button (MTP R 15HD RSA SEQ only) —** This recessed button selects between, Skew Equalization, Level, and Peaking when adjustments are needed.

⑨ **Rotary Adjust Knob (MTP R 15HD RSA SEQ only) —** Within any function, rotate this Adjust knob to make the appropriate changes to the skew delay, level, or peaking.

PowerCage Front Panel Port, Control, and Indicators

The following features are on the front panel of the PowerCage enclosure.

Figure 7. PowerCage Front Panel

① **Comm LED (Slots 1-16) —** This LED lights to indicate that the board at this location is selected for connection to the Configuration port (item ⑤). Repeatedly press the Comm Select button (item ④) to select the desired slot and installed board.

> **NOTE:** The Comm function only works with fiber optic boards.
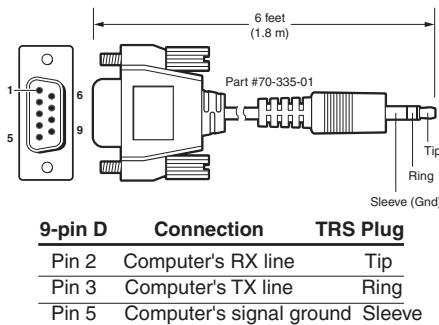
② **Power LED (Slots 1-16, PSUs 1 and 2, Fans 1 and 2) —** This LED lights to indicate that power is applied to the board at any of the slots.

③ **Alarm LED (Slots 1-16, PSUs 1 and 2, Fans 1 and 2) —** For use with fiber optic boards, where installed. This LED lights to indicate that light is received on any installed fiber optic board Rx connector at this location.

④ **Comm Select button —** Repeatedly press this button to select the desired board for connection to the Configuration port. The Comm LED (item ①) for the selected board lights. See Note above.

⑤ **Configuration port —** This 2.5 mm mini stereo jack communicates with a connected PC to enable bi- or unidirectional RS-232 with the installed fiber optic boards. Use the optional Extron 9-pin D to 2.5 mm mini jack TRS RS-232 cable, part #**70-335-01**, for this connection.

> **NOTE:** The Comm port function only works fiber optic boards.

9-pin D	Connection	TRS Plug
Pin 2	Computer's RX line	Tip
Pin 3	Computer's TX line	Ring
Pin 5	Computer's signal ground	Sleeve

Figure 8. 9-pin TRS RS-232 Cable 70-335-01

This port is RS-232 only, with the following protocols:
9600 baud, no parity, 8 data bits, 1 stop bit, no flow control

⑥ **Temperature LED —** This LED lights if the temperature within the PowerCage enclosure is high (approximately 167 °F [75 °C]) and equipment damage is imminent.

Board Setup and Operation

On the MTP T 15HD RSA board there are two DIP switches (switch #1 is for refresh rate, switch #2 is for audio/RS-232), and a 16-position rotary encoder for EDID selection.

The factory set defaults for these are:

- DIP switch #1 is 60 Hz (down)
- DIP switch #2 is audio (down)
- EDID encoder is 1024x768 (position 2)

On the MTP R 15HD RSA SEQ board there are four active DIP switches. These are: switch #1 = Horizontal sync, switch #2 = Vertical sync, switch 3 = RS-232 communication, switch #4 = S-video chroma routing, switch #5 = not used, switch #6 = not used.

The factory default settings for these are:

- DIP switch #1 is H– (down)
- DIP switch #2 is V– (down)
- DIP switch #3 is unidirectional RS-232 (down)
- DIP switch #4 is MTP compatible (down)
- DIP switch #5 and #6 not used (down)
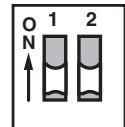
For both boards, access to the DIP switches and encoder is via a cut-out in the cover. If the settings need to be changed from the default setting, they should be set before the board is installed.

Alternatively, if changes are to be made after a board is installed, the board should be removed from the PowerCage by loosening the top and bottom retaining screws and carefully pulling the board out of its slot.

Changing the MTP T 15HD RSA Board Settings

1. Set the DIP switches as required.

Switch Position	Switch #1 Setting	Switch #2 Setting
Up/On	50 Hz	RS-232
Down/Off (default)	60 Hz	Audio

   a. Select RS-232 setting where RS-232 communication is desired.

   b. Select the desired refresh rate.

2. Using a small screwdriver, rotate the encoder pointer to the number or letter corresponding to the resolution required.
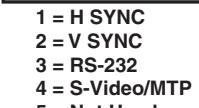
   See below for EDID encoder positions and resolutions:

Position	Resolution	Position	Resolution
0	N/A	8	1366 x 768
1	800 x 600	9	1400 x 1050
2	1024 x 768 (default)	A	1440 x 900
3	1280 x720	B	1600 x 1200
4	1280 x 768	C	1680 x 1050
5	1280 x 800	D	1920 x 1080
6	1280 x 1024	E	1920 x 1200
7	1360 x 768	F	N/A

Changing the MTP T 15HD RSA Board Settings

Change any of the four active DIP switches to the settings as shown in the table below.

Switch Position	Switch #1 Setting	Switch #2 Setting	Switch #3 Setting	Switch #4 Setting	Switch #5 Setting	Switch #6 Setting
Up/On	H+	V+	Bidirectional	S-Video green = luma blue = chroma	N/A	N/A
Down/Off (default)	H-	V-	Unidirectional	MTP standard green = luma red = chroma	N/A	N/A

```
ON
 1 2 3 4 5 6
1 = H SYNC
2 = V SYNC
3 = RS-232
4 = S-Video/MTP
5 = Not Used
6 = Not Used
```

1. To change either horizontal or vertical sync to positive, flip DIP switches 1 or 2 to up/on.

2. To change the RS-232 from unidirectional to bidirectional, flip DIP switch 3 to up/on.

3. To change signal routing for S-video signals, flip DIP switch 4 to up/on.

> **NOTE:** The fourth DIP switch is used for S-video routing of the chroma signal to the blue channel. When the switch is **up** (on) position (green = luma, blue = chroma), S-video is compatible with the Extron Signal Processing Products line, (for example DVS 304).
> When the switch is **down** (off), the signal follows the MTP standard and is output on the green and red channels of the VGA.

Switches 5 and 6 are not used.

Skew, Level, and Peaking Adjustments

See the Note on page 7 about skew delay, level, and peaking.

On the rear panel of the MTP R 15HD RSA SEQ board are three colored LEDs, a recessed select button, and an Adjust knob. These work in conjunction to allow the user to make adjustments to image skew delay, level, and peaking.

The select button allows the user to select any of the three individual functions for adjustment. When the select button is pressed a set number of times, the LED's indicate the current function. Press the select button as follows:

Button presses	Function	LED Color
1	Red skew delay	Red
2	Green skew delay	Green
3	Blue skew delay	Blue
4	Level	Green (Blinking)
5	Peaking	Blue (Blinking)

For Skew adjustment.

1. View the image critically, and note the color that is shifted furthest **right**.

> **NOTE:** This color **cannot** be adjusted leftward, but the remaining two colors can be adjusted **from left to right** until all three colors converge.

2. Noting the color that is shifted furthest **left**, press the select button accordingly to select that color (see table above). The corresponding LED lights.

3. Viewing the image, slowly rotate the Adjust knob until the selected color converges with the color furthest right.

4. Repeat steps **2** and **3** for the remaining color until all three colors are converged.

For Level Adjustment.

1. Press the select button **four** times to enter the level function. The green LED blinks.

2. View the image critically and rotate the adjust knob to increase or decrease the brightness of the displayed image.

For Peaking Adjustment.

1. Press the select button **five** times to enter the level function. The blue LED blinks.

2. View the image critically and rotate the adjust knob to increase or decrease the sharpness of the displayed image.

Resetting Skew Delay, Level and Peaking

To reset the skew delay, level, and peaking, **press and hold** the select button for three seconds. Release the select button.

Operation

After the transmitter, all receivers, and their connected devices are powered up, the system is fully operational. To optimize the displayed image make any appropriate adjustments as described in this guide.

If any problems are encountered, verify that the cables are routed and connected properly, and that all display devices have suitable resolutions and refresh rates, and the image has been optimized as far as possible.

If your problems persist, call the Extron S³ Sales & Technical Support Hotline. See the **contact numbers** on the rear page of this guide for the Extron office nearest you.

Reference Information

This section provides the specifications and part numbers for the PowerCage MTP T 15HD RSA and MTP R 15HD RSA SEQ modular boards.

- **Specifications**
- **Part Numbers**

Specifications

Video — PowerCage MTP T 15HD RSA, PowerCage MTP R 15HD RSA SEQ

Gain .... Unity
Number/signal type .... 1 set of proprietary analog signals
Connector .... 1 female RJ-45

Video input — PowerCage MTP T 15HD RSA

Number/signal type .... 1 analog RGBHV, RGBS, RGsB, RsGsBs, component video (YUVi or YUVp/HDTV),
S-video, or composite video
Connector .... 1 female 15-pin HD
Nominal levels .... 1 Vp-p for Y of component video and S-video, and for composite video
0.7 Vp-p for RGB and for R-Y and B-Y of component video
0.3 Vp-p for C of S-video
Minimum/maximum levels .... 0.3 V to 1.45 Vp-p
Impedance .... 75 ohms
Horizontal frequency .... 15 kHz to 130 kHz
Vertical frequency .... 30 Hz to 150 Hz
Return loss .... <-30 dB @ 5 MHz
DC offset (max. allowable) .... 250 mV

Video output — PowerCage MTP R 15HD RSA SEQ

Number/signal type .... 1 analog VGA-UXGA RGBHV, RGBS, RGsB, RsGsBs,
component video (YUVi or YUVp/HDTV), S-video, or composite video
Connector .... 1 female 15-pin HD
Nominal levels .... 1 Vp-p for Y of component video and S-video, and for composite video
0.7 Vp-p for RGB and for R-Y and B-Y of component video
0.3 Vp-p for C of S-video
Minimum/maximum levels .... 0.3 V to 1.45 Vp-p
Impedance .... 75 ohms
Return loss .... <-30 dB @ 5 MHz
DC offset .... <±25 mV with input at 0 offset
Skew compensation .... 62 ns
Maximum resolution .... Up to 1920x1200 or 2048x1080 or 1080p at 300 ft
Up to 1024x768 at 600 ft

> **NOTE:** **Refer to page 7 in this guide for maximum distances recommended for specific resolutions**.

Sync — PowerCage MTP T 15HD RSA, PowerCage MTP R 15HD RSA SEQ

Input/output type .... RGBHV, RGBS, RGsB, RsGsBs
Standards .... NTSC 3.58, NTSC 4.43, PAL, SECAM
Input level (transmitter) .... 3.5 V to 5.5 Vp-p, unterminated
Output level (receiver) .... 4.0 V to 5.0 Vp-p, unterminated
Input impedance (transmitter) .... 573 ohms ±5%
Output impedance (receiver) .... 110 ohms
Polarity
    Transmitter .... Positive or negative (follows input polarity)
    Receiver .... Positive or negative (switch-selectable)

Audio — PowerCage MTP T 15HD RSA, PowerCage MTP R 15HD RSA SEQ

Number/signal type .... 1 set of proprietary analog signals
Connector .... 1 female RJ-45
Gain .... Unbalanced output: 0 dB; balanced output: +6 dB
Frequency response .... 20 Hz to 20 kHz, ±1 dB
THD + Noise .... 0.15% @ 1 kHz, 0.3% @ 20 kHz at nominal level
S/N .... >70 dB at maximum output (unweighted)
Stereo channel separation .... >60 dB @ 1 kHz
CMRR .... >43 dB @ 20 Hz to 20 kHz

Audio input — PowerCage MTP T 15HD RSA

Number/signal type .... 1 stereo, unbalanced
Connector .... (1) 3.5 mm captive screw connector, 5 pole
Impedance .... >10k ohms, unbalanced
Nominal levels .... +4 dBu (1.23 Vrms), -10 dBV (316 mVrms)
Maximum level .... +18 dBu, (unbalanced) at 1% THD+N

> **NOTE:** 0 dBu = 0.775 Vrms, 0 dBV = 1 Vrms, 0 dBV ≈ 2 dBu

Audio output — PowerCage MTP R 15HD RSA SEQ

Number/signal type .... 1 mono, balanced/unbalanced
Connector .... (1) 3.5 mm captive screw connector, 5 pole
Impedance .... 50 ohms unbalanced, 100 ohms balanced
Gain error .... ±1 dB channel to channel
Nominal levels .... +4 dBu (1.23 Vrms), -10 dBV (316 mVrms)
Maximum level .... +18 dBu, unbalanced at 1% THD+N

Control/Remote

Serial ports
    Boards .... Pass-through, uni- or bidirectional Input/output: 1 set of proprietary signals on female RJ-45 jack
        Output/input: 1 RS-232 via 3 poles of a 3.5 mm captive screw connector (3 pole for transmitter, 5 pole for receiver)
Baud rate and protocol
    Boards
        Baud rates .... Up to 38400 bps at up to 600 ft (185 m). Higher data rates and distances are possible. Performance varies based on baud rate and cable length.)
        Protocol .... Data bits = 5 - 8
            Stop bits = 1 or 2
            Parity = odd, even, none
            Flow control = XON, XOFF, none
            Defaults: 8 data bits, 1 stop bit, no parity

> **NOTE:** For PowerCage MTP boards, protocol is mirrored between the transmitter and the receiver.

Serial control pin configurations
    Captive screw connector
        Boards .... Transmitter: 1 = Tx, 2 = Rx, 3 = GND
            Receiver: 3 = GND, 4 = Tx, 5 = Rx
    Mini stereo jack .... RS-232: tip = Tx, ring = Rx, sleeve = GND

General

Recommended cable type .... Extron Enhanced Skew-Free™ A/V UTP, CAT 5/5e/6 (shielded or unshielded)

Power consumption* .... 1 or 2* (positive-negative), 100 VAC to 240 VAC, 50-60 Hz; internal, hot-swappable
*A redundant power supply is optional.

    Each MTP board at 115 VAC, 60 Hz

        MTP T 15HD RSA: 4.30 watts
        MTP R 15HD RSA SEQ: 8.38 watts

Power input requirements (I/O boards)

        12 VDC, 1.0 A, supplied by the PowerCage enclosure

Temperature/humidity .... Storage: -40 to +158 °F (-40 to +70 °C) / 10% to 90%, noncondensing
Operating: +32 to +122 °F (0 to +50 °C) / 10% to 90%, noncondensing

Cooling .... Boards: convection, within the PowerCage enclosure

Enclosure type .... Metal

Enclosure dimensions

    PowerCage MTP R 15HD RSA SEQ

        Fits a double slot opening in a PowerCage enclosure.

    PowerCage MTP T 15HD RSA . Fits a single slot opening in a PowerCage enclosure.

Product weight

    PowerCage MTP R 15HD RSA SEQ

        1.0 lbs (0.5 kg)

    PowerCage MTP T 15HD RSA .. 0.8 lbs (0.4 kg)

Shipping weight

    PowerCage boards .... 2 lbs (1 kg) each

Vibration .... ISTA 1A in carton (International Safe Transit Association)

Regulatory compliance

    Safety .... CE, c-UL, UL

    EMI/EMC .... CE, C-tick, FCC Class A, ICES, VCCI

MTBF .... 30,000 hours

Warranty .... 3 years parts and labor

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NOTES: All nominal levels are at ±10%.

        Specifications are subject to change without notice.

Part Numbers

PowerCage MTP 15HD RSA Part Numbers

The PowerCage MTP 15HD RSA boards must be installed in a PowerCage 1600 enclosure.

PowerCage Boards	Part number
PowerCage MTP T 15HD RSA	70-817-01
PowerCage MTP R 15HD RSA SEQ	70-818-01

Included Parts

These items are included in each order for a PowerCage MTP T 15HD RSA and MTP R 15HD RSA SEQ:

Included parts	Part number
IEC power cord	
Tweeker (small screwdriver)	
Setup guide	
Captive screw 3-pole connectors	100-456-01
Captive screw 5-pole connectors	100-457-01

Cables and Connectors

Accessory	Part number
Enhanced Skew Free™ A/V UTP cable	26-569-0x
Enhanced Skew-Free A/V cable, 1000 ft (300m), non-plenum	22-141-03
Skew-Free UTP-P series, A/V cable, 75 ft (23 m)	26-570-07
CAT 6 Jack, black, Qty. 10	100-476-01
CAT 6 Jack, red, Qty. 10	100-477-01
CAT 6 Jack, blue, Qty. 10	100-478-01
CAT 6 Jack, orange, Qty. 10	100-479-01
CAT 6 Jack, gray, Qty. 10)	100-480-01
CAT 6 Jack, white, Qty. 10	100-481-01
CAT 6 Jack, ivory, Qty. 10	100-482-01

Extron® Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

USA, Canada, South America, and Central America:
Extron Electronics
1001 East Ball Road
Anaheim, CA 92805
U.S.A.

Europe, Africa, and the Middle East:
Extron Europe
Hanzeboulevard 10
3825 PH Amersfoort
The Netherlands

Asia:
Extron Asia
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363
Singapore

Japan:
Extron Electronics, Japan
Kyodo Building, 16 Ichibancho
Chiyoda-ku, Tokyo 102-0082
Japan

China:
Extron China
686 Ronghua Road
Songjiang District
Shanghai 201611
China

Middle East:
Extron Middle East
Dubai Airport Free Zone
F12, PO Box 293666
United Arab Emirates, Dubai

This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions, or modifications were made to the product that were not authorized by Extron.

NOTE:	If a product is defective, please call Extron and ask for an Application Engineer to receive an RA (Return Authorization) number. This will begin the repair process.

USA: (714) 491-1500 **Europe**: +31.33.453.4040
Asia: +65.6383.4400 **Japan**: +81.3.3511.7655

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

Extron Electronics makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.

Extron **USA - West**	Extron **USA - East**	Extron **Europe**	Extron **Asia**	Extron **Japan**	Extron **China**	Extron **Middle East**
Headquarters						
+800.633.9876	**+800.633.9876**	**+800.3987.6673**	**+800.7339.8766**	**+81.3.3511.7655**	**+400.883.1568**	**+971.4.2991800**
Inside USA/Canada Only	Inside USA/Canada Only	Inside Europe Only	Inside Asia Only	**+81.3.3511.7656** FAX	Inside China Only	**+971.4.2991880** FAX
+1.714.491.1500	**+1.919.863.1794**	**+31.33.453.4040**	**+65.6383.4400**		**+86.21.3760.1568**	
+1.714.491.1517 FAX	**+1.919.863.1797** FAX	**+31.33.453.4050** FAX	**+65.6383.4664** FAX		**+86.21.3760.1566** FAX	